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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/083,991	02/26/2002	Chia-Der Chang	TS01-660	5768

28112 7590 07/23/2003

GEORGE O. SAILE & ASSOCIATES
28 DAVIS AVENUE
POUGHKEEPSIE, NY 12603

EXAMINER
ISAAC, STANETTA D

ART UNIT	PAPER NUMBER
2812	

DATE MAILED: 07/23/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/083,991	CHANG ET AL.	
	Examiner	Art Unit	
	Stanetta D. Isaac	2812	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Peri d for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *29 May 2003* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-19* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-19* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Response to Arguments

1. Applicant's arguments filed 05/29/03 have been fully considered but they are not persuasive. Stated in col. 7 lines 42-53, Wang teaches that a chemical-mechanical polishing with a polishing mechanism and etching slurry is performed to remove the smoothing layer 62 in a largely uniform manner starting from upper smoothing surface 63 and moving downward into the layer of 60. As the smoothing material is removed, portions of the dielectric layer 56 are progressively exposed. The CMP operation is continued into layer 56 to remove dielectric material at locations where portions of layer 56 are exposed. In addition, stated in col. 6, lines 38-64, Wang teaches various ways where the smoothing material can be for an example, an electrically insulating material and the smoothing layer can be created by a deposition/spinning procedure that includes an elevated-temperature curing step. The applicant argues that Wang does not describe the use of a resist as a smoothing material nor the use of a very hard polishing pad, at least Shore "D" 52, to remove the layer of smoothing material and dielectric,

2. Stated in col. 4 lines 33-44; col. 5 lines 1-67; col. 6 lines 1-30, Klein teaches the dielectric material **150** can be made of BPSG it would then prove to be equivalent in well known conventional planarization methods using a CMP process to include a semiconductive layer such as a resist layer since Wang teaches that the smoothing layer 60 is made from the same dielectric material. The applicant argues that the photoresistant gel described by Klein is different from the resist material described in claims 1-19, the use of the photoresistant gel as a filler material described by Klein is different from the use of resist as a smoothing material described in Wang

and the claims 1-19 is not described by Klein and the use of a polishing pad having a hardness of at least Shore "D" 52 described in claims 1-19 is not described by Klein.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wang Patent Number 6,461,932 in view of Klein Patent Number 6,511,576.

5. Wang discloses a semiconductor method substantially as claimed. See **FIGS. 1-6b**, where Wang teaches a method of planarizing substrates having shallow trench isolation, comprising:

providing a substrate;

forming trenches **50** in said substrate;

depositing a layer of dielectric **56** on said substrate thereby filling said trenches with said dielectric;

6. However pertaining to claims 5-8, 10 11, and 15-19, Wang fails **forming a layer of resist** on said layer of dielectric and **removing all of said layer of resist** and part of said layer of dielectric using said polishing pad and chemical mechanical polishing thereby leaving said trenches filled with trench dielectric and forming a planar surface. In addition Wang fails the method of claim 11 wherein said layer of resist is formed by spinning resist on said substrate followed by baking said resist and the resist is photoresist.

7. See **FIGS. 1-7** where Klein teaches **forming a layer of resist** on said layer of dielectric and **removing all of said layer of resist** and part of said layer of dielectric using said polishing pad and chemical mechanical polishing thereby leaving said trenches filled with trench dielectric and forming a planar surface. In addition Klein teaches the method of claim 11 wherein said layer of resist is formed by spinning resist on said substrate followed by baking said resist and the resist is photoresist. In view of Klein it would have been obvious to one of ordinary skill in the art to incorporate Klein into Wang semiconductor method because since the smoothing layer **60** in Wang and the dielectric material **150** in Klein both can be made of BPSG it would then prove to be equivalent and as a result be obvious in well known conventional planarization methods using a CMP process to include a semiconductive layer such as a resist layer. (See **col. 4 lines 33-44; col. 5 lines 1-67; col. 6 lines 1-30**).

8. Pertaining to claim 2, Wang teaches the method of claim 1 wherein said substrate is a silicon wafer having devices formed therein.

9. Pertaining to claim 3, Wang teaches the method of claim 1 wherein said dielectric is silicon dioxide deposited using high density plasma chemical vapor deposition.

10. Pertaining to claim 4, Wang teaches the method of claim 1 wherein said trenches are shallow trench isolation trenches.

11. Pertaining to claim 9, Wang teaches the method of claim 1 further comprising:

forming a layer of pad oxide **42** on said substrate before said forming trenches in said substrate;

forming a layer of silicon nitride **44** on said layer of pad oxide before said forming trenches in said substrate; and

forming trench openings **50** in said layer of pad oxide and said layer of silicon nitride before said forming trenches in said substrate.

12. Pertaining to claim 11, Wang teaches a method of planarizing substrates having shallow trench isolation, comprising:

providing a substrate;

forming a dielectric base **40** on said substrate;

forming trench openings **50** in said dielectric base;

forming trenches in said substrate directly below said trench openings in said dielectric base;

depositing a layer of trench dielectric **56** on said dielectric base thereby filling said trenches with said trench dielectric;

13. However, Wang and Klein fail in the providing a polishing pad having a hardness of at least Shore "D" 52. Given the teachings of the references, it would have been obvious to determine the optimum thickness, temperature as well as condition of delivery of the layers involved. *See In re Aller, Lancey and Hall* (10 USPQ 233-237) "It is not inventive to discover optimum or workable ranges by routine experimentation. Note that the specification contains no disclosure of either the critical nature of the claimed ranges or any unexpected results arising therefrom. Where patentability is said to be based upon particular chosen dimensions or upon another variable recited in a claim, the Applicant must show that the chosen dimensions are critical. *In re Woodruff*, 919 f.2d 1575,1578,16 USPQ2d 1934, 1934 (Fed. Cir. 1990).

14. Any differences in the claimed invention and the prior art may be expected to result in some differences in properties. The issue is whether the properties differ to such an extent that

the difference is really unexpected. *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986)

15. Appellants have the burden of explaining the data in any declaration they proffer as evidence of non-obviousness. *Ex parte Ishizaka*, 24 USPQ2d 1621, 1624 (Bd. Pat. App. & Inter. 1992).

16. An Affidavit or declaration under 37 CFR 1.132 must compare the claimed subject matter with the closest prior art to be effective to rebut a prima facie case of obviousness. *In re Burckel*, 592 F.2d 1175, 201 USPQ 67 (CCPA 1979).

17. Pertaining to claim 12, Wang teaches the method of claim 11 wherein said substrate is a silicon substrate having devices formed therein.

18. Pertaining to claim 13, Wang teaches the method of claim 11 wherein said trench dielectric is silicon dioxide deposited using high density plasma chemical vapor deposition.

19. Pertaining to claim 14, Wang teaches the method of claim 11 wherein said dielectric base comprises a layer of pad oxide formed on said substrate and a layer of silicon nitride on said layer of pad oxide.

20. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

21. A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37

CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

22. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Stanetta D. Isaac whose telephone number is 703-308-5871. The examiner can normally be reached on Monday-Friday 7:30am -5:30pm.

23. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John Nebling can be reached on 703-308-3325. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-3432 for After Final communications.

24. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

Stanetta Isaac
Patent Examiner
July 11, 2003

John F. Niebling
Supervisory Patent Examiner
Technology Center 2800